17. A box contains 4 red, 3 green, and 2 blue balls. Two balls are drawn at random. Find the probability that they are of different colors.

18. Discuss the applications of Poisson and binomial distributions with examples.

19. Describe the t-test for a single mean and give an example.

20. A company wants to test the effect of three advertising strategies (A, B, C) on the sales of two different products (X and Y). The following data represents sales (in thousands) under different strategies :

| Strategy | Product X | Product Y |
|---|---|---|
| A | 50 | 45 |
| B | 60 | 55 |
| C | 70 | 65 |

Perform a two-way ANOVA to determine if there is a significant effect of advertising strategies and product type on sales.

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**NOVEMBER/DECEMBER 2025**

# 23UECS42A/23UESC42A — STATISTICAL METHODS AND THEIR APPLICATIONS II

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Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. What is least squares method?

2. Write the equation for a power curve fitting model.

3. Define mutually exclusive events.

4. What is mathematical expectation?

5. Define binomial distribution.

6. What is the mean of a Poisson distribution?

7. What is null hypothesis?

8. Define confidence interval.

9. What is local control in experimental design?

10. Define randomized block design (RBD).

SECTION B — ($5 \times 5 = 25$ marks)

Answer ALL questions.

11. (a) Fit a straight-line equation $Y = ax + b$ using the least squares method for the data below:

| $x$ | 1 | 3 | 5 | 7 | 9 |
|---|---|---|---|---|---|
| $y$ | 2 | 6 | 10 | 14 | 18 |

Or

(b) Explain the difference between linear and nonlinear regression.

12. (a) Given that the probability of a student passing a test is 0.7, and the probability of another student passing is 0.8, find the probability that both will pass if their events are independent.

Or

(b) Explain the concept of independent and dependent events.

13. (a) The number of typing errors per page in a book follows a Poisson distribution with a mean of 2 errors per page. Find the probability that a randomly selected page has no errors.

Or

(b) Compare the binomial and normal distributions.



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14. (a) A sample of 40 bulbs is tested, and their average lifetime is found to be 1200 hours with a standard deviation of 150 hours. Test whether this sample represents a population with a mean lifetime of 1250 hours at a 5% significance level (Use z-test).

Or

(b) Discuss the large sample test for correlation.

15. (a) Explain one-way classification in ANOVA.

Or

(b) Differentiate between CRD, RBD, and LSD.

SECTION C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

16. Fit an exponential curve $Y = ab^x$ using the least squares method for the given data :

| $x$ | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| $y$ | 2.5 | 3.5 | 5.2 | 7.4 | 10.1 |